

## DISTRIBUTION OF *MICROSTYLUM MOROSUM* AND *M. GALACTODES* (DIPTERA: ASILIDAE): SIGNIFICANT RANGE EXTENSIONS<sup>1</sup>

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**ABSTRACT:** *Microstylum morosum*, long listed as endemic to Texas, is documented for Kansas (nine counties), Oklahoma (13 counties), Arizona (two counties), New Mexico and Colorado (one county each). The species' range is shown to extend 450 miles north of the northernmost Texas county of record. *Microstylum galactodes*, known to occur in Texas and Kansas, is newly documented for Oklahoma (four counties). *M. galactodes* is also reported here from nine counties in Kansas, seven counties in New Mexico, three counties in Arizona, and three counties in Colorado; nearly all of these are newly documented counties for the species. A number of counties are also added to the lists originally published in Bromley's (1934) summary of Texas Asilidae, bringing the counts to 30 Texas counties for *M. galactodes* and 20 Texas counties for *M. morosum*.

*Microstylum* Macquart is a robber fly genus of "About one hundred species ... most ... occur[ring] in South and Central Africa, Madagascar, India, Ceylon, China, the Malay States, and certain of the East Indies" (Bromley, 1927). E. W. Fisher (pers. commun., 1999) notes that there are currently 127 species of *Microstylum* listed for the Old World in various regional catalogs. (Also see Hull, 1962 for additional data on world-wide distribution.) Four species of *Microstylum* have been described from North America (Martin, 1960): two from the southwestern United States, and two from Mexico. The two species found north of the Mexican border are *M. galactodes* Loew and *M. morosum* Loew. The taxon *M. pollens* Osten Sacken (Texas) listed by Hull (1962) and others is considered a color variant of *M. morosum* by Martin and Wilcox (1965).

The keys to the genera of Asilidae in Wood (1981) can be used to identify *Microstylum*; keys to separate the two species that occur in the U.S. appear in Back (1909), Bromley (1934) and Martin (1960). These are large insects. Bromley (1934) lists the lengths of *M. galactodes* as 30-34 mm and *M. morosum* as 35-50 mm, however we find that the larger *M. galactodes* and smaller *M. morosum* do overlap in size. The two species are easily distinguished. *M.*

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*galactodes* having milky white wing membranes, the body reddish-brown, and the head and thoracic dorsum evenly covered with whitish pruinescence, *M. morosum* having black to brown wings, black to brown body, and with thoracic pruinescence restricted to the lateral margins. Figure 1 illustrates a typical specimen of each species.

Back (1909) and Martin (1960) gave the range of *M. galactodes* as Texas, New Mexico and Kansas, and that of *M. morosum* as Texas only. James (1941) listed *M. galactodes* for Colorado. Martin and Wilcox, in the chapter on Asilidae in Stone et al. (1965), extended the ranges for both *M. galactodes* and *M. morosum* to include Arizona.

Having collected *M. morosum* recently in Kansas, the authors became interested in more accurately portraying the distribution of *Microstylum* north of the Mexican border. We present records here, gathered with the generous assistance of a number of museums and collectors, that document the widespread southwestern U.S. distribution of *Microstylum*. Both *M. galactodes* and *M. morosum* have been found to occur in the states of Arizona, Colorado, Kansas, New Mexico, Oklahoma, and Texas. We list and map all counties of record we could find for these states. We also list the Mexican states for which records were found.

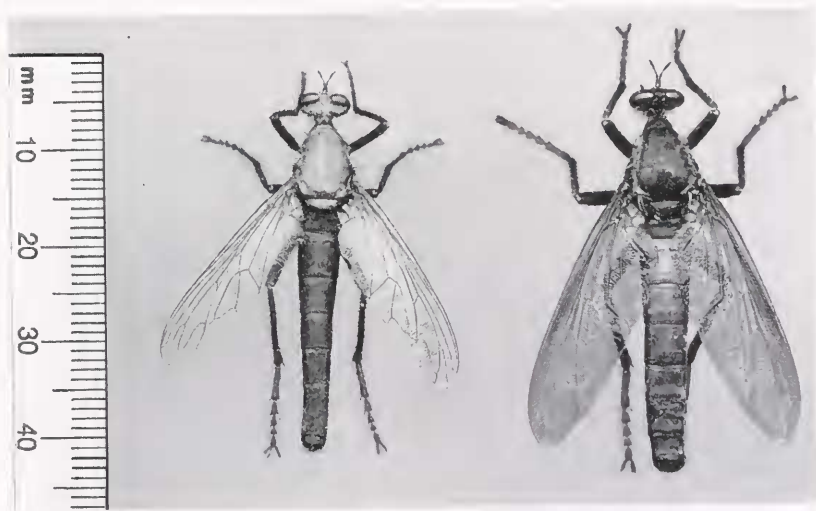


Figure 1. Specimens of *Microstylum galactodes* (left, Crane Co., TX) and *M. morosum* (right, Riley Co., KS) from the Kansas State University Collection. Specimens were scanned using a flatbed scanner at 300 dots per inch by R. E. Charlton.

DISTRIBUTIONAL RECORDS FOR *MICROSTYLUM MOROSUM*

**Sources of Records:** AM-NMSU - Arthropod Mus., New Mexico St. Univ. (D. B. Richman); Back - E. A. Back, 1909; Bromley - S. W. Bromley, 1934; CAS - Cal. Acad. Sci. (E.W. Fisher); CRN - C. Riley Nelson, personal collection, Provo, UT; CSU - Col. St. Univ. (B. Kondratieff); DB-NMSU - Dept. Biol., New Mexico St. Univ. (G. S. Forbes); EEM - Enns Entomol. Mus., Univ. of Missouri-Columbia (K. Simpson); EWF - Eric W. Fisher personal collection; Hine - J.S. Hine, 1918; James - M. T. James, 1941; KU - The Snow Entomol. Mus., Univ. of Kans.; KSU - Kans. St. Univ. Mus. Entomological and Prairie Arthropod Res. (R. E. Charlton); Martin & Wilcox - Martin & Wilcox, 1965; OSU - Entomol. & Plant Pathology Dept., Okla. St. Univ. (D. Arnold & R. Grantham); RJBa - R. J. Bauernfeind personal collection, Manhattan, KS; RJBe - R. J. Beckemeyer personal collection, Wichita, KS; RG - R. Grantham personal collection, Stillwater, OK; RLH - R. L. Huber personal collection, Prairie Village, KS; Smith - Smith et al., 1962; SWD - S.W. Dunkle personal collection, Plano, TX; TAM - Tex. A & M Univ. Coll. (D. Oswald & E. G. Riley).

## Texas

*Microstylum morosum* was described by Loew in 1872 from specimens collected in Dallas, Texas. It is a magnificent animal (Figure 2.), "...probably the largest asilid occurring in North America." (Bromley, 1934). As long as 50 mm (Bromley, 1934), it has a "stiltlike neck" and dark brown wings. Bromley (1934) described it as a "...green-eyed monster'...[with]...an antedeluvian [sic] appearance...", as it has emerald green eyes when alive.

Back (1909) provided data for a number of specimens from Dallas County, including the male and female types. He also listed a specimen from Victoria



Figure 2. *Microstylum morosum* in life. Photo by R. J. Elzinga of Kansas State University.

County, Texas (June 5). Hine (1918) collected the species from the Trans-Pecos ("...forty miles south and slightly west of Pecos, the nearest town being Toyahvale...[in Reeves County]"). In his review of Texas Asilidae, Bromley (1934) said that *M. morosum* was "...rather common in the open woodlands and adjoining cotton fields in the bottom lands along the Trinity and Bosque Rivers...[and occurs in] Dallas, McLennan, Bosque, Madison, Victoria, Travis, Mills, [and] Brewster Counties, June 28 - Aug. 26." Records for a number of additional Texas counties have been gathered from various collections and these are summarized at the end of this paper.

### Kansas

Smith et al. (1962) noted that *M. morosum* was the "...largest and least-common species..." of the asilids listed in their popular book on Kansas insects. However, they did not list any specific Kansas localities or specimens. The occurrence of the species in Kansas went unrecorded in later publications and catalogs.

We document the occurrence of *M. morosum* at the northern end of its range for nine counties in Kansas and for one county in Colorado. These records constitute a significant northern range extension for *M. morosum*. Five counties (Chautauqua, Cowley, Montgomery, Geary and Riley, Kansas) are located in the Osage Plains physiographic region; Sumner County is in the Arkansas River Lowlands; Barber and Comanche Counties in Kansas are in the Mixed Grass Prairie region (Schoewe, 1949). Meade County, Kansas and Baca County, Colorado are in the High Plains Short Grass Prairie.

Barber County and Comanche County are located on the Kansas-Oklahoma border. The Red Hills physiographic region in which Barber County is located is characterized by rolling hills with exposed rocky slopes. Vegetation "...is mixed grass prairie with an overstory of red cedar forming a savannah-like aspect" (Zimmerman and Patti, 1988). A single specimen was collected from Barber County by R. J. Bauernfeind of Kansas State University on 25 July, 1990, and is in his collection. The Kansas University (KU) collection contains three specimens from Schwartz Canyon in Comanche County, collected 4 July 1991 by G. A. Salsbury. Ron Huber (pers. commun., 1999) has specimens from both Barber and Comanche Counties in his personal collection: "KS: Comanche Co., Schwartz Canyon, 13 mi S. & 16 mi E. of Coldwater, 7/4/91 leg G. Salsbury & R. Huber, 2 m 6f, Sec. 14, T 34, R 16", and "KS: Barber Co., 14.5 mi W. Medicine Lodge on Hwy 160, hilltop just W of MP 211, leg R. Huber, 7/6/91, 1f". The Colorado State University collection also contains specimens of *M. morosum* from both Barber and Comanche Counties.

There is a single specimen of *M. morosum* in the KU collection taken in Caldwell, Kansas (Sumner County) by Stallings and Turner, 19 July 1953, and a second Sumner County specimen collected by G. A. Salsbury, 16 Aug. 1979 labeled "edge of woods". R. L. Huber (pers. commun., 1999) has a fe-

male specimen in his personal collection taken in Caldwell, Kansas 6/19/52 leg Stallings & Turner. Sumner County is on the Oklahoma border.

Chautauqua and adjacent Montgomery Counties are also located along the Kansas-Oklahoma border east of Cowley County. The collection locale for the most recently-collected specimen from Chautauqua County was along a gravel road 1.5 miles east of the Cowley/Chautauqua County line and 5 miles north of the Oklahoma border (R8E, T34S, Section 15). This site is within the Osage Cuestas subregion of the Osage Plains. The Osage Cuestas, also known as the "cross timbers", are comprised of a forest-prairie mosaic with blackjack and post oak on the ridges and tall grasses or cultivated fields in the lowlands. One specimen was collected while it was flying in the lee of a roadside hedge row in the company of numerous dragonflies (Odonata: Anisoptera: Libellulidae: *Tramea lacerata*). It was taken in the early afternoon of VII-30-1994 by the senior author, and is in his collection. The Kansas University collection contains a single specimen from Chautauqua County taken in Sedan, Kansas, July 25, 1951 by Robert E. Beer and three specimens from Montgomery County, one with acridid prey, collected by Beamer and Lawson August 3, 1923.

Geary County and Riley County are both located at the northern edge of the Flint Hills physiographic subregion of the Osage Plains, and are bounded to the north by the edge of the glaciated region. In the Flint Hills, the upland vegetation is dominated by tall grasses, with riparian forests along the streams. The KSU collection contains one specimen from Geary County, collected by J. Schesser on August 12, 1955. Of the five KSU specimens collected from Riley County, the first was collected by R.C. Smith in Manhattan, Kansas on 15 July, 1921. There are two specimens that were collected by T. E. Hall in July 1929 labeled "Riley Co." These specimens from Geary and Riley Counties that were collected prior to 1962 are likely the source of the account by Smith et al. (1962). The fourth Riley County specimen is one collected by N. Marston on July 4, 1964.

The junior author has observed *M. morosum* on the Konza Prairie in Riley county in recent years; most of his sightings were of males perched atop the scattered small bushes on rocky prairie hillsides. The fifth Riley County specimen is a voucher specimen collected from the Konza Prairie by Brian Kopper (14-VII-1997). The KU collection contains three additional specimens from Riley County taken in 1909.

Cowley County, in the southern portion of the Flint Hills, adjoins Sumner County on the east; Ron Huber (pers. commun., 1999) has a female specimen in his collection that was collected from Cowley County (Cambridge, Kansas) 12 July 1975 by D. Stallings.

The Kansas University collection contains two specimens of *M. morosum* from Meade County, Kansas ("2500 ft., F. X. Williams, VII-10-1911"), at the eastern edge of the short-grass prairie.



## Colorado

In addition to the specimens of *M. morosum* from Barber and Comanche Counties in Kansas, the Colorado State University collection has specimens from Baca County (B. Kondratieff, pers. commun., 1999), the southeastern-most county in Colorado. The species had not been previously reported from that state.

## Oklahoma

*M. morosum* has not previously been reported for the state of Oklahoma; it was recorded from a total of 13 counties in the course of this study. Most of the records were provided by Richard Grantham (pers. commun., 1999) of the Oklahoma State University Department of Entomology and Plant Pathology. Specimens in the OSU collection were from counties across the northern tier of Oklahoma, with a single county in the south-central part of the state (Mayes County) also represented. Most of the records were from the 1930's or the 1960's:

Alfalfa County (Byron: 11 Aug. 1931); Cimarron County (Black Mesa: 24 June 1933, 2 specimens 22 June 1966; Kenton: 24 June 1933); Garvin County (Lindsay: 27 July, 1976); Grant County (Medford: 8 Aug. 1931); Kay County (Blackwell: 2 specimens, 12 Aug. 1931); Mayes County (Locust Grove: 12 July 1963); Nowata County (Lenapah: 1 Aug. 1931); Osage County (Grainola: 1 Aug. 1931; Fairfax, 28 & 30 July 1932); Pawnee County (Watchorn: 11 July 1930; Pawnee: 12 & 13 July 1932); Payne County (Lake Carl Blackwell: 3 Aug. 1960, 5 specimens 13 Aug. 1960; Stillwater: 12 July 1969).

In addition, Dr. Grantham has 2 specimens of *M. morosum* taken 30 June 1999 from Black Mesa in Cimarron County in his personal collection. Ron Huber (pers. commun., 1999) has a single female specimen of *Microstylus morosum* from Oklahoma in his personal collection. It was taken in Grant County and was collected 19 July 1953 from Wakita, Oklahoma by D. Stallings. Three additional records for *M. morosum* in Oklahoma were found in the Department of Biology collection at New Mexico State University (DB-NMSU) by Greg Forbes (pers. commun., 1999). The Oklahoma records from NMSU are: "Jackson Co., Elmer 28 vii 1983, 1f, H. Reed, J Nelson; Wagoner Co., 18 viii 1976, 1m (on ground) D. C. Arnold; Love Co., 9 mi west Marietta, 18 vii 1971, 1f, K. Mennealy". Jackson and Love Counties are on the Oklahoma/Texas border. Wagoner County is in northeastern Oklahoma just east of Tulsa. These records fill in the gap between Texas and Kansas and indicate that *M. morosum* very likely occurs through most of Oklahoma.

## New Mexico

The DB-NMSU collection also contains a specimen from New Mexico

which constitutes the first report of *M. morosum* for this state: "Union Co., Clayton, 10 vii 1962, 1f, David Hine." Union County is directly south of Baca County, Colorado.

### Arizona

Finally, Dr. Eric Fisher (pers. commun., 1999) reports records of *M. morosum* from Arizona in the California Academy of Sciences collection: Santa Cruz County ("Santa Rita Mtns., VII-9-1924, A Nichol...") and Cochise County ("Douglas, VII-3-1924, E. Bal..."), both in southeastern Arizona. Prior publications have listed only "Arizona" with no specific locality information.

### Summary

These records indicate that *M. morosum* has a much greater north-south range than previously indicated in the literature. Its range extends through Kansas and Oklahoma to 60 miles south of the Nebraska border. The Kansas localities range from 325 to 465 miles north of Dallas county which was the northernmost Texas county of record. The species also appears to occur across nearly the breadth of the state, from the tall-grass prairie region of eastern Kansas to the high plains at least as far as Baca County, Colorado and Union County, New Mexico, just west of the Kansas-Colorado border.

### DISTRIBUTIONAL RECORDS FOR *MICROSTYLUM GALACTODES*

*Microstylum galactodes* was described by Loew in 1866 from three male and six female specimens from New Mexico. Back (1909) listed the species as occurring in Kansas, Texas and New Mexico, but did not reference specific localities other than citing "Pecos River, Texas". Bromley (1934) called *M. galactodes* a "...large, striking species...", and Kondratieff (pers. commun., 1999) comments that "A mating pair in flight is a sight to behold."

### Texas

Bromley (1934) noted that *M. galactodes* "Occurs in the central and western portions of...[Texas]", and he went on to list "Pecos, Brewster, Frio, Bexar, Webb, Jim Hogg, Brown, Jeff Davis, Presidio, Brooks, Starr, [and] Ector Counties."

The KSU collection contains 16 specimens from Texas; four of these are from counties not mentioned by Bromley (1934): one specimen from Kleberg County ("Kingsville, Tex., 7-6-21, F. M. Hull (?)"); two specimens from Tarrant County ("May, Tx, 27-VII-31, R. H. Painter collector"); one specimen from "Crane Co., Tx., June 21, 1958, R. H. Painter and F. M. Painter collectors." Additional county records for Texas gathered in preparing this paper are summarized at the end of the paper.

### Colorado

James (1941) listed *M. galactodes* from Colorado ("Las Animas [County], July 12, 1931 [Leonard Sweetman]"). However, the species' occurrence in the state was not recorded in later publications. The Colorado State University collection contains specimens of *M. galactodes* from Baca, Bent and Las Animas Counties, all in extreme southeastern Colorado. It also contains specimens from Potter County in the panhandle of Texas, and from Val Verde County, which lies on the Texas border with Mexico. Ron Huber (pers. commun., 1999) has a male specimen from Baca County, Colorado ("...Picture Canyon, W of Cranshaw, 7/12/91 leg M. Kippenham, B. Kondratieff et al...") in his personal collection.

### New Mexico

Back (1909) did not include any specific locality data for *M. galactodes* in New Mexico, listing only the state. The Texas A&M collection contains 2 specimens of *M. galactodes* from Lea County, the southeastern-most county in New Mexico, and 7 specimens from Eddy County. The Enns Entomology Museum of the University of Missouri-Columbia, contains one specimen of *M. galactodes* from Las Cruces [Dona Ana County], collected 12 July 1917 by R. C. Shannon (K. Simpson, pers. commun., 1999). The Department of Biology collection at New Mexico State University contains a number of specimens collected by G. S. Forbes from Dona Ana County. Dr. Forbes (pers. commun., 1999) has also supplied to the authors some interesting notes on the habitats used by *M. galactodes* in New Mexico:

"NM: Dona Ana Co.: Upper Box Canyon, 0.8 mi. SW Picacho Pk. 4200'

Habitat large sandy arroyo between sandstone hills, adjoining desert scrub to NW. Major shrubs include mesquite, tarbush (*Flourensia*), creosotebush, littleleaf sumac, and soap tree yucca. Most specimens perched on large mesquites or on littleleaf sumac in the canyon. One individual of *M. galactodes* was a prey item of *Promachus giganteus* Hine.

29 vi 1982 1m, G. Forbes (GSF)

6 vii 1982 1m, 1f, GSF

18 vii 1982 1f, GSF

7 vii 1983 2m, 1f, GSF

...

Afton Lava, 20 mi. W Mesilla Dam (about 25 mi. SW Las Cruces)

Habitat creosotebush-tarbush scrub on NE side of Afton lava flows; was collected from both of these shrubs.

21 vi 1983 2m, 2f, (1 pair in cop) GSF

26 vi 1983 2m, 3f, GSF

...

Jornada Experimental Range, 3.5 mi. N. USDA HQ.....Adults perched on *Opuntia imbricata* (tree cholla)....f, 2 July 1999 (GSF), perched on mesquite and tobosa grass"

...

"Socorro Co., NM: White Sands Missile Range, 33 deg. 36.01' N, 106 deg. 39.83' W, about 10 mi. W of the Trinity Site, in black grama grassland, sandy soil, with *Yucca elata*



common. One f. perched on yucca stalk caught, others seen, 1 July 1999, J. Van Zee and S. Bird, collectors."

The DB-NMSU collection also contains one specimen from De Baca County, New Mexico: "SE end Sumner Lake, 9 vii 1986, 1 m, GSF", and several from Eddy County: "Rt. 128 at Co. Rd. 787, ca. 1 mi. E WIPP [Waste Isolation Pilot Project...10 mi. E Jct. of Rt. 31 and Rt. 128...about 28 mi. SE Carlsbad] site turnoff, 10 vi 1989, 1m, 1f, GSF; Los Mendanos, nr. WIPP site, T22S R13E, sec. 15, 12 vii 1978, 2f, T. Marr & W. Whitford; 32 deg. 23' N, 103 deg. 51.4' W, 1f, DeLorme, McHugh, Schaffner (Texas A&M) 17 Aug. 1979". The Arthropod Museum of New Mexico State University (D. B. Richman, pers. commun., 1999) contains one specimen of *M. galactodes* from Chaves County ("Bottomless Lakes State Park, Plot #8 pitfall trap. July 18, 1985. Janet Swain Collector"). The KU collection contains the following New Mexico specimens: one specimen labeled "White Sands, NM [Otero County] VI-27-40 L. J. Lipovsky", one specimen labeled "Roswell New Mexico [Chaves County] 6-26-32 R. H. Beamer", and two specimens labeled "Malaga N.M. 7-11-36" [Eddy County], one collected by D. R. Lindsay, the other by J. H. Beamer. Greg Forbes (pers. commun., 1999) states that he "...wouldn't be surprised..[to find]...*M. galactodes*...in all the southern counties of NM at lower elevations. It seems to occur in a wide range of plant communities and soil types: black grama grasslands in sandy soils, tobosa grass playas and tarbush playas in heavy soils, and open desert scrub in deep sand."

### Kansas

The KSU collection contains three specimens of *M. galactodes* from Kansas ("Hamilton Co., Kansas '28, Aug 6., elevation 4000 ft., R. H. Painter Collector"), one with an acridid prey. Hamilton County is in the High Plains physiographic region, which was characterized historically as a short-grass prairie, although recent years have seen the introduction of irrigation for cultivated crops. The area is one of little vertical relief. The KU collection contains specimens from 6 other Kansas Counties, most of them also in the short-grass prairie region. Among the specimens collected by F. X. Williams in 1911 in western Kansas were the following: one from "Grant Co. 2800 ft. ... VII-27-1911", one from "Kiowa Co. Kan. 2250 ft. ...VII-1-1911", one labeled "Stanton Co. Kan. 3000 ft. ... VII-30-1911", and one from "Meade Co. Kan. 2500 ft. ... VII-10-1911". The KU collection also contains two specimens from "Morton Co. Ks. 7-22-24 O. O. Bare" and two from Finney County labeled "Garden City Kans. Aug '95 H. W. Menke" (the labels on these specimens appear to be quite old and we believe the specimens to date from 1895). The Biology Department collection at NMSU (G. Forbes, pers. commun., 1999) contains a single specimen taken from Seward County, (on the Oklahoma border and

directly west of Meade County) Kansas: "10.5 mi. N. Liberal, 21 vii 1984, lf. R. & C. Huber." Finally, Ron Huber (pers. commun., 1999) has one specimen in his collection from Comanche County: "...Schwartz Canyon, 13 mi. S. & 16 mi. E. of Coldwater, 7/4/91, leg G. Salsbury & R. Huber, lf, Sec. 14, T 34, R 16". This single *M. galactodes* was taken together with a number of specimens of *M. morosum*.

The specimens of *Microstylum* that we have in hand thus indicate that in Kansas *M. galactodes* is the more western species and *M. morosum* the more eastern, though their ranges do overlap in the southwestern quarter of Kansas. *Microstylum galactodes* in Kansas occurs mostly in the short grass prairies. There is obviously a need for more collecting and observation to better understand the detailed distributions of the two species.

### Oklahoma

There are 8 specimens of *M. galactodes* from Oklahoma in the KSU collection. Seven specimens are from Randlett in Cotton County ("15-VII-31, R. H. Painter collector"). Cotton County is on the Texas-Oklahoma border. The eighth specimen was collected in Woodward, Oklahoma, in July, 1925 by G. K. Teripening. Woodward County is in northwestern Oklahoma. The OSU collection contains a number of specimens of *M. galactodes*, most from Cimarron County, the extreme western county in the Oklahoma panhandle. Richard Grantham (pers. commun., 1999) reported the following: Cimarron County (Kenton: 6 June (2 specimens), 29 & 30 June 1933; Boise City: 2 specimens 10 July 1933; 15N, 13 W of Boise City: 2 specimens dated 14 July 1971; Black Mesa: 21 July 1983); Harmon County (Vinson: 9 July 1934). These records span the western portion of the state from south to north, and are the first records published that document specific localities for this species in Oklahoma.

### Arizona

Finally, the KU collection contains a specimen of *M. galactodes* labeled "Mustang Mt. Ar. 6-12-33 R. H. Beamer". The Mustang Mountains are located in Santa Cruz County, Arizona, near the Mexican border. E. W. Fisher (pers. commun., 1999) reports specimens of *M. galactodes* from Cochise County (Wilcox, VII-1-1968) and Yavapai County, Arizona (Peebles Valley, 130 km east of the California/Arizona state line - this appears to be the western-most record for *Microstylum*).

### DISCUSSION

While we list a number of previously unpublished county records for both species of *Microstylum* occurring north of the Mexican border, the exact distributions, particularly through the northern and western extent of their ranges,

remain to be definitized. There are indications that *M. morosum* may occur in a larger variety of habitats than *M. galactodes*, which seems to occur most often in short grass prairies and scrub lands. *M. galactodes* appears to be the more common of the two species. The records gathered for this paper yield a ratio of the number of specimens of *M. galactodes* to specimens of *M. morosum* of 1.8:1. Both species seem to be somewhat local in distribution where they do occur. G. Forbes (pers. commun., 1999) found *M. galactodes* in the Las Cruces, New Mexico area "...at only 5 sites in a number of years of collecting" and B. Kondratieff (pers. commun., 1999) observes that "...*M. galactodes* can be very common in certain areas of eastern Colorado." *Microstylum galactodes* appears to be restricted to the western third of Kansas and Oklahoma while *M. morosum* is found across both states nearly to their eastern borders.

Date ranges for *M. morosum* records are from 5 June through 26 August, with 80% of the records occurring in the period from the first of July through

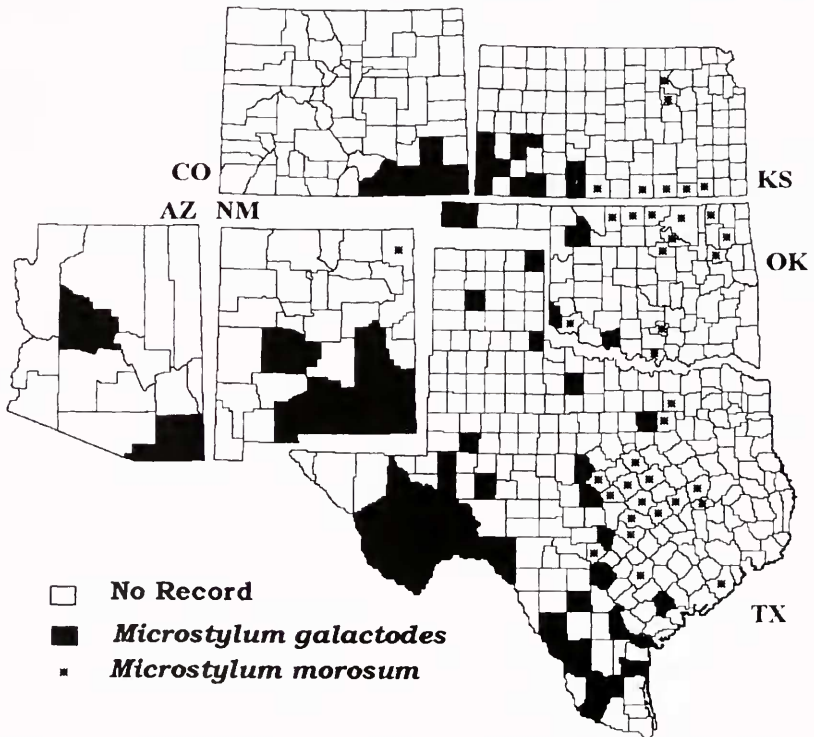


Figure 3. The recorded distribution of *Microstylum morosum* (counties denoted by an asterisk) and *M. galactodes* (shaded counties) in Arizona, Colorado, Kansas, New Mexico, Oklahoma, and Texas.

mid-August. Date ranges for *M. galactodes* are 6 June through 17 August, with 88% of the records cited occurring between mid-June and the end of July. Figure 3 illustrates the distributions by county in Arizona, Colorado, New Mexico, Texas, Oklahoma and Kansas as indicated by the records cited here. We have also listed in the summary below the few records that we came across for the occurrence of *M. galactodes* and *M. morosum* in Mexico. The fact that these are large, conspicuous, and rather spectacular insects should be helpful in filling in the gaps in our understanding of their distribution. We hope that this paper will provide inspiration and information to encourage insect collectors to search for and to further document the occurrence and biology of these impressive predators.

### SUMMARY OF COUNTY AND STATE RECORDS

***Microstylum galactodes*:** UNITED STATES: ARIZONA: State, no county listed (Martin & Wilcox); Cochise (EWF); Santa Cruz (KU); Yavapai (EWF). COLORADO: Baca (CSU, RLH); Bent (CSU); Las Animas (James; CSU). KANSAS: State, no county listed (Back); Comanche (RLH); Finney (KU); Grant (KU); Hamilton (KSU); Kiowa (KU); Meade (KU); Morton (KU); Seward (DB-NMSU); Stanton (KU). NEW MEXICO: State, no county listed (Back); Chaves (AM-NMSU, KU); De Baca (DB-NMSU); Dona Ana (DB-NMSU, EEM); Eddy (DB-NMSU, KU, TAM); Lea (TAM); Otero (KU); Socorro (DB-NMSU). OKLAHOMA: Cimarron (OSU); Cotton (KSU); Harmon (OSU); Woodward (KSU). TEXAS: State "Pecos River" (Back); Baylor (KU); Bexar (Bromley, TAM); Blanco (CRN); Brewster (Bromley, KU, TAM); Brooks (Bromley, TAM); Brown (Bromley, KSU); Childress (TAM); Crane (KSU); Dimmitt (CRN); Ector (Bromley, KSU); Frio (Bromley); Jeff Davis (Bromley); Jim Hogg (Bromley, TAM); Kleberg (KSU); Lipscomb (TAM); Live Oak (KU); Martin (TAM); Pecos (Bromley, DB-NMSU, KU, TAM); Potter (CSU); Presidio (Bromley); Reagan (TAM); Reeves (KU); San Patricio (TAM); San Saba (DB-NMSU); Starr (Bromley, TAM); Tarrant (KSU); Terrel (DB-NMSU); Val Verde (CRN, CSU, DB-NMSU); Victoria (KU); Webb (Bromley). MEXICO: COAHUILA (TAM); DURANGO (KU, TAM).

***Microstylum morosum*:** UNITED STATES: ARIZONA: State, no county listed (Martin & Wilcox); Cochise (CAS); Santa Cruz (CAS). COLORADO: Baca (CSU). KANSAS: State, no county listed (Smith); Barber (CSU, RLH, RJBa); Chautauqua (RJBe, KU); Comanche (CSU, KU, RLH); Cowley (RLH); Geary (KSU); Meade (KU); Montgomery (KU); Riley (KSU, KU); Sumner (KU, RLH). NEW MEXICO: Union (DB-NMSU). OKLAHOMA: Alfalfa (OSU); Cimarron (OSU, RG); Garvin (OSU); Grant (OSU, RLH); Jackson (DB-NMSU); Kay (OSU); Love (DB-NMSU); Mayes (OSU); Nowata (OSU); Osage (OSU); Pawnee (OSU); Payne (OSU); Wagoner (DB-NMSU). TEXAS: Bell (TAM); Bosque (Bromley); Brazoria (TAM); Brewster (Bromley); Collin (TAM); Coryell (TAM); Dallas (Back, Bromley); Gonzales (KU); Kendall (CSU); Lampasas (SWD); Leon (SWD); Madison (Bromley, TAM); McLennan (Bromley, KU, TAM); Milam (TAM); Mills (Bromley, DB-NMSU, KSU); Reeves (Hine); Robertson (SWD); Travis (Bromley, CRN); Victoria (Back, Bromley, DB-NMSU); Williamson (TAM). MEXICO: CHIHUAHUA (DB-NMSU); COAHUILA (TAM).

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